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FROM DEEP LAKES TO MOUNTAIN TOPS: EXPLORING LONG AND SHORT CHRONOLOGIES WITH BAYESIAN STATISTICS

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This paper aims at exploring the potential of Bayesian statistics for chronologies using radiocarbon-dates from different settings: dry- and wetland sites of the Northern Alpine Foreland and the Inner Alpine area. In order to understand dynamic cultural phenomena independent scientific dating is indispensable. Beside dendrochronology, radiometric dating methods based on carbon isotopy are still most important. For multi-site evaluations easily accessible data collections are vital as e.g. provided by the database 'Radon'¹ used here. Furthermore, statistical approaches such as sequential calibration, work best with large amount of data. In our three case studies, the combination of both has yielded compelling results beyond conventional approaches:

1. Sequence-models of Neolithic wetland sites stratigraphies: Despite the possibility of using high-precision dendrochronologies, ¹⁴C-dates are still needed in cases of poor organic preservation. Using prior information such as stratigraphies, stratified artefacts and isolated dendrodates, extraordinary high-confidence Bayesian models can be achieved, like the examples Zurich-Kleiner Hafner (CH) and Ehrenstein (D) of the MET-project¹ show.
2. Sum calibration-models for Inner Alpine Neolithic and Bronze Age sites: Until recently, having nearly no radiocarbon dates at hand, the chronology of this area was based on typological comparisons with the Swiss Plateau and Southern Germany. Within the CMCT-project³ we were able to generate new samples for Radiocarbon dates from Neolithic and Bronze Age sites. Hence, an absolute chronological framework can be established for the first time.
3. Systematic radiocarbon dating of Late Neolithic human remains: The dolmen of Oberbipp (CH) is one of a rare undisturbed inhumations collective burial with approximately 40 individuals. More than 60 samples of right femora could be dated in three different laboratories, yielding very robust results regarding the burial sequence.

In all examples the statistic software R and c14bazAAR⁴ were used.

1 radon.ufg.uni-kiel.de

2 SNSF-project: <http://p3.snf.ch/Project-156205>

3 SNSF-project: <http://p3.snf.ch/project-165306>

4 <https://github.com/ISAAKiel/c14bazAAR>

Keywords

Bayesian statistics

¹⁴C-models

prehistory

Alpine region

Note/comment